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SYNOPSIS OF THE NORTH AMERICAN SPECIES
OF *SIGMODON*.

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The present brief synopsis of the North American species of *Sigmodon*, commonly known as cotton rats, is the outgrowth of an attempt to work out the distribution of the several forms occurring in the state of Texas. In this connection it became necessary to make a critical study of the group, which has resulted in the recognition of 21 apparently valid forms, 10 of which are here described for the first time. A long discarded name, *berlandieri*, is reinstated, and two recent names are placed in synonymy. Of the 21 species and subspecies, 9 occur in the southern United States; the others are scattered over Mexico and Central America. Of the four species described from northern South America I have seen no specimens. The names and type localities are as follows: *Sigmodon sanctæmarte* Bangs, from Pueblo Viejo, Colombia; *Sigmodon bogotensis* Allen, from Plains of Bogota, Colombia; *Sigmodon peruanus* Allen, from Trujillo, Peru; *Sigmodon simonsi* Allen, from Eten, coast of northwest Peru.

The material on which the conclusions are based consists of

about 1000 specimens in the Biological Survey collection and the private collection of Dr. C. Hart Merriam, both in the United States National Museum, besides a number of types and topotypes from other sources, for the use of which I am indebted to Dr. F. W. True, executive curator, and Mr. Gerrit S. Miller, Jr., assistant curator of mammals, in the U. S. National Museum; to Dr. J. A. Allen, curator of mammals and birds, American Museum Natural History; and to Mr. Outram Bangs, curator of mammals, Museum of Comparative Zoology.

The North American species of *Sigmodon* fall naturally into two groups, which may be designated the *hispidus* group, and the hairy-tailed group. The former, of which *hispidus* was the first named species, is characterized by a semi-naked tail, the coarse annulations of the epidermis being scarcely obscured by the short scattered hairs. The forms of this group inhabit the Lower Sonoran and Tropical zones, are widely distributed, with an almost continuous range, and, with the one exception of an overlapping species (*alleni*) are here treated as subspecies of *hispidus*. In general the pelage is coarse and hispid, usually much more so in summer than in winter, but this character varies considerably with the various forms. The group includes *hispidus*, *littoralis*, *spadicipygus*, *texianus*, *berlandieri*, *eremicus*, *arizonæ*, *mascotensis*, *tonalensis*, *major*, *toltecus*, *saturatus*, *microdon*, *boruce*, and *alleni*.

The hairy-tailed group, of which *fulviventris* was the first known species, is characterized by a moderately hairy tail, the short, bristly hairs almost or quite concealing the underlying annulations. In most of the species the pelage is softer than is usual in the *hispidus* group. The group is not distinguished by cranial characters and the species differ as widely among themselves as they do from those of the *hispidus* group. So far as ascertained they inhabit the Upper Sonoran and Transition zones in widely scattered mountains in Mexico and adjoining parts of the United States. In most cases they appear to be isolated by surrounding areas belonging to lower zones. Most of the species seem to have a very limited distribution and are distinguished by strongly marked characters. The group includes *fulviventris*, *melanotis*, *minimus*, *ochrognathus*, *leucotis*, *alticola* and *amoles*, all but the last of which are treated as full species.

Key to Species.

1. Tail thinly haired; skull relatively long and narrow.
 2. Size large, hind foot averaging 32 or more.
 3. Upperparts mainly warm brown.
 4. Upperparts uniformly brown, size larger - - - *hispidus*.
 - 4'. Upperparts brownest on rump, size smaller - *spadicipygus*.
 - 3'. Upperparts light gray, blackish or yellowish gray.
 4. Upperparts dark gray; much black and no brown *littoralis*.
 - 4'. Upperparts light buffy or yellowish gray.
 5. Upperparts pale buffy gray.
 6. Pelage fine and not very hispid - - - *eremicus*.
 - 6'. Pelage coarse and very hispid, especially in summer.
 7. Size large, hind foot averaging 40 - - - *major*.
 - 7'. Size medium, hind foot not over 36.
 8. Hind foot about 33 - - - *berlandieri*.
 - 8'. Hind foot 35-36 - - - *arizonæ*.
 5. Upperparts dark buffy or yellowish gray.
 6. Upperparts buffy gray; hind foot about 34 *mascotensis*.
 - 6'. Upperparts yellowish gray; hind foot 41 - *tonalensis*.
 - 2'. Size small, hind foot averaging less than 32.
 3. Upperparts buffy gray - - - *texianus*.
 - 3'. Upperparts tawny or dull brownish gray.
 4. Upperparts tawny or dull yellowish.
 5. Audital bullæ wide and flattened - - - *boruca*.
 - 5'. Audital bullæ high and narrow, rounded or elongated.
 6. Tail short, averaging 103; audital bullæ narrow *saturatus*.
 - 6'. Tail longer, averaging 112; audital bullæ short and rounded - - - *alleni*.
 - 4'. Upperparts dull brownish gray.
 5. Belly white; feet clear gray - - - *toltecus*.
 - 5'. Belly grayish buff; feet yellowish brown - *microdon*.
 - 1'. Tail well haired; skull short and wide.
 2. Upper half of outer surface of ear black.
 3. Size large, hind foot 30-33.
 4. Upperparts grizzled buffy; lowerparts ochraceous *ochrogaster*.
 - 4'. Upperparts grizzled tawny; belly rich ferruginous *melanotis*.
 - 3'. Size small, foot 28; upperparts gray; belly buffy *minimus*.
 - 2'. Outer and inner surface of ears whitish or buffy gray.
 3. Ears buffy gray; nose conspicuously ochraceous *ochrognathus*.
 - 3'. Ears light gray or whitish; nose not conspicuously ochraceous.
 4. Ears silvery gray; belly white - - - *leucotis*.
 - 4'. Ears darker gray; belly buffy.
 5. Upperparts rich tawny gray - - - *alticola*.
 - 5'. Upperparts dull tawny gray - - - *amoles*.

***Sigmodon hispidus* Say and Ord.**

Sigmodon hispidus Say and Ord, Jour. Acad. Nat. Sci. Phila., IV, pt. ii, 354, 1825.

Type locality.—St. Johns River, Florida.

General characters.—Pelage full and soft in winter, coarser and slightly hispid in summer.

Color.—Upperparts rich umber brown, darkened by black underfur and long black hairs; belly whitish, smoky gray or dull buffy brown; feet dull rusty brown; tail blackish, slightly lighter below.

Skull.—Relatively short and wide with well arched upper outline.

Measurements.—Average of 8 adults from Riceboro, Georgia: total length 256; tail 106; hind foot 32. *Skull* (No. 45,169, from Riceboro, Georgia): basal length 32; nasals 14; zygomatic breadth 21; mastoid breadth 15; alveolar length of upper molar series 6.7.

Distribution.—North Carolina to northern Florida and west to southern Louisiana, in Austroriparian zone.

Specimens examined.—Total number 125, from the following localities:

North Carolina: Raleigh 33, Elkin 1.

South Carolina: Georgetown 6, Beaufort 27, Society Hill 1.

Georgia: Augusta 5, Butler 5, Riceboro 20, Savannah 1, Nashville 1.

Florida: San Mateo 1, Gainesville 3, Chattahoochee 3, Milton, 2.

Alabama: Greensboro 5, Catherine 1, Gallion 4.

Mississippi: Bay St. Louis 3.

Louisiana: Houma 1, Lafayette 3, Avery 2.

***Sigmodon hispidus littoralis* Chapman.**

Sigmodon hispidus littoralis Chapman, Bull. Am. Mus. Nat. Hist. II, 118, June 7, 1889.

Type locality.—East Peninsula, opposite Micco, Florida.

General characters.—Slightly larger and darker than *hispidus*, with coarser more hispid pelage.

Color.—Upperparts dark sooty gray coarsely lined by the dark and light hairs, buffy wash of the main coat obscured by the long black hairs and black underfur; feet and tail dark gray or blackish; upper surface of tail quite black.

Skull.—Relatively larger, narrower and less arched than in *hispidus*.

Measurements.—Average of 6 adult topotypes: total length 284; tail 114; hind foot 32. *Skull* (No. 70,808, ♂ ad.): basal length 33; nasals 14; zygomatic breadth 21; mastoid breadth 14.6; alveolar length of upper molar series 6.8.

Distribution.—Eastern part of the peninsula of Florida, from Lake Harney to the Everglades.

Specimens examined.—Total number 119 from the following localities in Florida: Peninsula opposite Micco (type locality) 42, Lake Harney 29,

Titusville 17, Sebastian 9, Lake Kissimmee 2, Kissimmee River 5, Mullet Lake 2, Eden 4, Miami 7, Everglade 2.

***Sigmodon hispidus spadicipygus* Bangs.**

Sigmodon hispidus spadicipygus Bangs, Proc. Bost. Soc. Nat. Hist. XXVIII, 192, March, 1898.

Type locality.—Cape Sable, Florida.

General characters.—Like *hispidus* but smaller, less uniformly brown, and with lighter dentition; pelage soft as in *hispidus*.

Color.—Upperparts dark brownish gray, becoming warm brown only on rump; belly grayish brown or whitish; feet dull brownish; tail blackish, slightly lighter below.

Skull.—Similar to that of *hispidus* but smaller with conspicuously lighter dentition.

Measurements.—Type: total length 279; tail 98; hind foot 31–33 [from original description]. *Skull* (No. 4485, ♂ ad., Bangs Collection, from Flamingo, Fla.): basal length 30; nasals 12; zygomatic breadth 19.5; mastoid breadth 14.5; alveolar length of upper molar series 6.2.

Distribution.—The extreme southern part of the peninsula of Florida.

Specimens examined.—Total number 8 from three localities: Cape Sable, Flamingo and Planter, Florida.

Remarks.—In external as well as cranial characters this form differs more from *littoralis* than from true *hispidus* with which Mr. Bangs supposed it to intergrade along the west coast of the peninsula of Florida.

***Sigmodon hispidus texianus* (Aud. and Bach.).**

Arvicola texiana Aud. and Bach. Quad. N. Am. III, 229, 1853.

Type locality.—Brazos River, Texas.

General characters.—Slightly smaller and paler than typical *hispidus*.

Color.—Upperparts grayish brown or dark buffy gray; belly grayish or buffy white; feet clear gray; tail gray with blackish line along the top. Colors darkest in fresh fall pelage, lightest in faded spring pelage.

Skull.—Differing from the skull of *hispidus* mainly in smaller size, less arched outline, and smaller, more rounded audital bullae.

Measurements.—Average of 4 adults from Richmond, Texas: total length 248; tail 103; hind foot 30. *Skull* (No. 97,014, ♂ ad.): basal length 30; nasals 13; zygomatic breadth 21; mastoid breadth 14; alveolar length of upper molar series 6.4.

Distribution.—Approximately the eastern half of Texas, westward to Vernon and San Antonio, and northward to Cairo, Kansas.

Specimens examined.—Total number 77 from the following localities:

Texas: Richmond 4, Matagorda 20, Velasco 1, Port Lavaca 6, Talley Island 6, Corpus Christi 4, San Antonio 18, Boerne 1, Fisher Co. 1, Vernon 2, Gainesville 1.

Oklahoma: Ft. Reno 2, Ft. Cobb 1, Orlando 2, Alva 1.

Kansas: Cairo 1.

Remarks.—*S. texianus* is an intermediate form between the dark, rich *hispidus* and the very pale *berlandieri*, grading both ways in accordance with the change from humid to arid climate. Specimens from Oklahoma and Kansas are almost equally near to *hispidus*, while San Antonio and Corpus Christi specimens could just as well be referred to *berlandieri*.

***Sigmodon hispidus berlandieri* Baird.**

Sigmodon berlandieri Baird, Proc. Acad. Nat. Sci. Phila., VII, 333, 1855.

Sigmodon hispidus pallidus Mearns., Proc. U. S. Nat. Mus., XX, 504, March 15, 1897. From El Paso, Texas.

Type locality.—Rio Nazas, Coahuilla, Mexico.

General characters.—About the size of *hispidus* or averaging a little smaller and much paler; pelage full and soft in winter, thin and very hispid in summer.

Color.—Upperparts light buffy or ashy gray; nose not conspicuously yellowish; belly white; feet light gray; tail distinctly bicolor, light gray below, blackish above.

Skull.—Similar to the skull of *texianus*; differing from that of *hispidus* in less arched outline and smaller, more rounded bullae.

Measurements.—(No. 58,074, ♂ ad., from Jimulco, Coahuila, Mexico): total length 232; tail 105; hind foot 33. Average of 5 adults from Del Rio, Texas: total length 256; tail 113; hind foot 32.5. *Skull* (No. 58,073, ♂ ad., from Jimulco, Coahuila): basal length 30.5; nasals 12.3; zygomatic breadth 19; mastoid breadth 13.4; alveolar length of upper molar series 6.5.

Distribution.—Rio Grande and Pecos valleys from Brownsville to El Paso, Texas, and Carlsbad, New Mexico; south to southern Jalisco, Mexico.

Specimens examined.—Total number 200, from the following localities:

Texas: El Paso and vicinity 7, Guadalupe Mts. 4, Langtry 3, Painted Caves 3, Del Rio 7, Sycamore Creek 3, Eagle Pass 7, Santa Tomas 27, Sauz 2, Brownsville 20, Ft. Clark 3.

New Mexico: Carlsbad 3.

Chihuahua: Juarez 1, Chihuahua City 18, Santa Rosalia 8, Presidio del Norte 1.

Coahuila: Rio Nazas 1, Jimulco 2.

Nuevo Leon: Doctor Arroyo 1.

Tamaulipas: Nuevo Laredo 7, Matamoras 11, Camargo 26, Victoria, 2, Jaumave 6, Soto la Marina 9.

San Luis Potosi: Hda. La Parada 3, Villar 1, Jesus Maria 1, Molino 1.

Queretaro: Tequisquiapam 1.

Zacatecas: Valparaiso Mts. 3.

Jalisco: Huejuquilla 1, Lagos 2, Atemajac 1, Ameca 1, Chacala 1, Zacualco 3, Zapotlan 2.

Remarks.—*S. h. berlandieri* is a pale desert form of the *hispidus* group ranging over a wide extent of extremely arid country in western Texas and northeastern Mexico and intergrading with forms to the east, south and west.

Prof. Baird described it from specimens "collected between San Antonio and El Paso by Mr. Clark and in Northern Mexico by Lieut. Couch". The skulls of these two specimens still in the U. S. National Museum show no important subspecific characters but are of importance geographically. The one from between San Antonio and El Paso apparently, but not positively, (see old museum catalogue) came from Presidio del Norte, and the other, No. 566, from Rio Nazas, southern Coahuila (Baird, Mamm. N. A. p. 505). No type was designated but as Baird gave full measurements of No. 566 this specimen is generally considered the type. Specimens in the Biological Survey collection from Jimulco (about 30 miles south of the short Coahuila section of the Rio Nazas), from near the mouth of the Pecos and from El Paso, Texas, are indistinguishable and are all clearly referable to this pale gray form. Typical specimens of *berlandieri* are no nearer to typical *texianus* than that species is to *hispidus*, so that if *texianus* is to be recognized, *berlandieri* must also be.

***Sigmodon hispidus eremicus* Mearns.**

Sigmodon hispidus eremicus Mearns, Proc. U. S. Nat. Mus. XX, 504, advance sheets, March 15, 1897.

Type locality.—Cienega Well, Sonora, Mexico, on east bank of Colorado River, 30 miles south of United States and Mexican boundary line.

General characters.—Size slightly larger than *hispidus*; pelage fine and rather lax and soft, colors pale.

Color.—Upperparts pale yellowish gray; belly whitish; feet light gray; tail brown above, gray below. From *berlandieri* it differs in slightly more buffy upperparts and less of the mixture of black hairs.

Skull.—Heavy, rough and much ridged, even in specimens that are not very old; coronoid process of jaw short and wide; bullae short and rounded as in *berlandieri*.

Measurements.—Type: total length 280; tail 128; hind foot 34. *Skull* of type: basal length 30.6; nasals 13.3; zygomatic breadth 20.3; mastoid breadth 14; alveolar length of upper molar series 6.6.

Distribution.—Along both sides of the lower Colorado River.

Specimens examined.—Total number 49 from the following localities:

Sonora: Cienega Well, south of Mexican boundary on east side of Colorado River 19, Colorado River at mouth of Hardee River 11.

California: Ft. Yuma 19.

***Sigmodon hispidus arizonae* Mearns.**

Sigmodon hispidus arizonae Mearns, Bull. Am. Mus. Nat. Hist. II, 287, Feb. 21, 1890.

Type locality.—Ft. Verde, Arizona.

General characters.—Size large; pelage coarse and hispid; colors pale.

Color.—Upperparts light buffy gray as in *berlandieri*; nose slightly yellowish; belly white; feet and tail as in *berlandieri* and *eremicus*.

Skull.—I have not been able to get a skull of this species for examination, but the original measurements show it to have been larger than the average *eremicus* skull.

Measurements.—Type (from original description): total length 320; tail 121. Hind feet of two topotypes taken from dried specimens, 35 and 36. *Skull* (from original description): total length 40; nasals 15.9; zygomatic breadth 23; alveolar length of upper molar series 7.1.

Remarks.—Without seeing skulls of this form I am in doubt as to its status and affinities, but the two skins from the original topotype series, kindly sent for examination by Dr. Allen, indicate a larger form than *eremicus* with more hispid pelage.

***Sigmodon hispidus mascotensis* Allen.**

Sigmodon mascotensis Allen, Bull. Am. Mus. Nat. Hist. IX, 54, March 15, 1897.

Sigmodon colimae Allen, Bull. Am. Mus. Nat. Hist. IX, 55, March 15, 1897. From Plains of Colima, Colima, Mexico.

Type locality.—San Sebastian, near Mascota, Jalisco, Mexico.

General characters.—Slightly larger than *hispidus* or *berlandieri*, with especially longer tail and larger hind foot; pelage in summer very coarse and hispid.

Color.—Upperparts dark buffy gray with bright buffy or ochraceous nose; belly yellowish white; feet dull brownish gray; tail brownish gray below and brownish black above, less distinctly bicolor than in *berlandieri*.

Skull.—Averaging larger than in *berlandieri* with relatively smaller bullae and the same concavo-convex interparietal and posteriorly truncate nasals.

Measurements.—Type (from skin): total length 272; tail 117; hind foot 32. Average of 6 adults from Colima: total length 253; tail 116; hind foot 34. *Skull* of type: basal length 30.7; nasals 13.3; zygomatic breadth 19.4; mastoid breadth 13.2; alveolar length of upper molar series 6.3.

Distribution.—West coast of Mexico from western Jalisco to southern Oaxaca.

Specimens examined.—Total number 62 from the following localities:

Jalisco: San Sebastian 2.

Colima: Colima 10, Armeria 12.

Guerrero: Chilpancingo 5, Acapulco 1, near Ometepepec 2, Tlaxtoquilla 1.

Oaxaca.—Puerto Angel 5, Oaxaca 5, Tehuantepec 6, Tamazulapam 2 im., Huajuapam 3 im., Cuicatlan 1 im. (sp?).

Morelos: Yautepec 4 im., Quernevaca 2 im.

Michoacan: Querendaro 1 (very large).

***Sigmodon hispidus tonalensis* subsp. nov.**

Type from Tonalá, Chiapas, Mexico, No. 75,144, U. S. National Museum, Biological Survey Collection. ♂ ad. Collected August 9, 1895 by E. W. Nelson and E. A. Goldman. Original No. 8312.

General characters.—Similar to *mascotensis* but larger and slightly browner; pelage very hispid.

Color.—Upperparts yellowish brown, more yellowish about nose; belly creamy white; feet and tail dull brownish gray, tail not distinctly bicolor. *Young*, duller and slightly darker colored.

Skull.—Long and narrow, heavily ridged in adults, interparietal pointed at ends and wide in middle, pushing supraoccipital well back.

Measurements.—Type: total length 350; tail 166; hind foot 41. *Skull* of type: basal length 34.5; nasals 15; zygomatic breadth 22; mastoid breadth 14.5; alveolar length of upper molar series 6.8.

Distribution.—Western Chiapas and eastern Oaxaca.

Specimens examined.—Total number 5, from 3 localities:

Chiapas: Tonalá 1; Mountains near Tonalá 1.

Oaxaca: Santo Domingo 3 (not typical).

Remarks.—This is merely a large form of *mascotensis*, from which there is no sharp geographic separation. Specimens from Chilpancingo, Guerrero, could be referred to it as well as to *mascotensis*.

***Sigmodon hispidus major* subsp. nov.**

Type from Sierra de Choix, 50 miles northeast of Choix, Sinaloa, Mexico. No. 96,275, U. S. National Museum, Biological Survey Collection. ♂ ad. Collected October 20, 1898 by E. W. Nelson and E. A. Goldman. Original No. 13,154.

General characters.—Very large, almost equalling *Mus norvegicus*; feet stout; tail with coarse annulations; pelage coarse and hispid.

Color.—Upperparts light brownish gray; nose yellowish; belly white or yellowish white; feet light gray; tail blackish above, dark gray below.

Skull.—Massive and heavily ridged in adults; interparietal strap-shaped with wide, rounded ends; nasals notched posteriorly; audital bullae relatively as well as actually large and elongated.

Measurements.—Type: total length 365; tail 156; hind foot 40.5. Average of 5 adults: 351; 160; 40. *Skull* of type: basal length 36; nasals 16; zygomatic breadth 23.5; mastoid breadth 16.4; alveolar length of upper molar series 7.3.

Distribution.—West coast of Mexico from Tepic to southern Sonora.

Specimens examined.—Total number 16, from the following localities:

Sinaloa: Sierra de Choix 6, Culiacan 1, Rosario 1, Plomosas 1.

Tepic: Acaponeta 2, Tepic 1, San Blas 1.

Sonora: Alamos 3 (not typical).

Remarks.—This largest North American species of *Sigmodon* occurs with *alleni* at San Blas, Tepic, and while it may be quite distinct from its nearest congeners, *berlandieri* and *mascotensis* and does not appear to overlap the range of either, it unquestionably belongs to the same general group and should stand as a subspecies.

***Sigmodon hispidus toltecus* Saussure.**

Hesperomys toltecus Saussure, Rev. et Mag. de Zool. XII, p. 98, 1860.

Type locality.—Mountains of the state of Vera Cruz, Mexico.

General characters.—Conspicuously smaller and darker colored than *berlandieri*; molars and audital bullae relatively smaller.

Color.—Upperparts dull brownish gray; belly whitish; feet dark gray, not yellowish or brown; tail bicolor, gray below, blackish above.

Skull.—Smaller than that of *berlandieri* with much smaller bullae and molars.

Measurements.—Average of 8 adults from Orizaba, Vera Cruz: total length 235; tail 100; hind foot 28. *Skull* (No. 58,226, ♂ ad. from Orizaba): basal length 29.5; nasals 13; zygomatic breadth 18; mastoid breadth 13; alveolar length of upper molar series 6.

Distribution.—Eastern Mexico from Alta Mira, southern Tamaulipas to Orizaba, Vera Cruz.

Specimens examined.—Total number 54 from the following localities:

Vera Cruz: Orizaba 17, Chichicaxtle 4, Mirador 1.

Tamaulipas: Alta Mira 12.

San Luis Potosi: Valles 7.

Puebla: Metlaltoyuca 13.

Remarks.—This is the only known species of North American *Sigmodon* of which I have not been able to examine the type or topotypes. As no more definite type locality was assigned than the mountains of Vera Cruz, I am assuming that the Orizaba specimens are typical, an assumption that seems safe in view of the wide range of the form, and the fact that no other species is known to occur in the general region, and that the characters assigned in the original description do not disagree with those of the present series of specimens from localities covering most of the state of Vera Cruz. Specimens from as far north as Alta Mira, Tamaulipas, are indistinguishable from the Orizaba series, but farther north they seem to grade into *berlandieri*, while in the lower country of southern Vera Cruz they run into *saturatus*.

***Sigmodon hispidus saturatus* subsp. nov.**

Type from Teapa, Tabasco, No. 99,998, U. S. National Museum, Biological Survey Collection ♂ ad. Collected April 5, 1900, by E. W. Nelson and E. A. Goldman. Original No. 14,108.

General characters.—About the size of *berlandieri* but with much shorter tail and richer coloration; larger and more fulvous than *toltecus*.

Color.—Upperparts dark reddish brown; belly dull cinnamon brown, rarely whitish; feet yellowish brown; tail black, but little lighter below. *Young*, darker and duller colored.

Skull.—Short and compact with heavy rostrum; molars and audital bullae as in *berlandieri*.

Measurements.—Average of 7 adult topotypes: total length 250; tail 103; hind foot 31.2. *Skull* of type: basal length 29.5; nasals 12.7; zygomatic breadth 19; mastoid breadth 13.5; alveolar length of upper molar series 6.

Distribution.—Mainly in Chiapas, Tabasco, and southern Vera Cruz.

Specimens examined.—Total number 101, from the following localities: *Tabasco*: Teapa 18, Frontera 4, Monte Cristo 2.

Chiapas: Palenque 1, Yajalon 1, Chicharras 4, Huehuetan 7, Mts. near Comitán 7, Comitán 8, Ocuilapa 2, Tenejapa 2.

Guatemala: Zunil 2, Hda. Chancol 2, Jacaltenango 6, Nenton 7.

Oaxaca: Tuxtepec 4, Cuicatlan 1 (im.), Mts. near Santo Domingo 3.

Vera Cruz: Tlacotalpam 2, Otatitlan 3, Coatzacoalcos 6, Motzorongo 9.

Remarks.—While the rich coloration is unusually marked in specimens from Teapa, the type locality, considerable variation is shown throughout the wide range assigned to this form. Specimens from the west slope in southern Chiapas and western Guatemala are slightly larger and duller colored without showing any difference to warrant separation or agreeing with any other described form. In general appearance they resemble *S. borucae* Allen, of Costa Rica, more than anything else, but in cranial characters are nearer to *saturatus*. To the northwest the intergradation with *toltecus* is shown by specimens from Motzorongo.

***Sigmodon hispidus microdon* subsp. nov.**

Type from Puerto Morelos, Yucatan, No. 108,467, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected March 13, 1901 by E. W. Nelson and E. A. Goldman. Original No. 14,581.

General characters.—Size small; tail short; colors dark and dull; teeth smaller than in any other North American *Sigmodon*.

Color.—Upperparts dark, dull brown; belly grayish white or buffy; tail black above, brownish black below.

Skull.—Small, slender, and narrow posteriorly with small audital bullae and very small molars.

Measurements.—Type: total length 243; tail 96; hind foot 32. *Skull*

of type: basal length 28.4; nasals 12.5; zygomatic breadth 18; mastoid breadth 13; alveolar length of upper molar series 5.5.

Distribution.—Northern Yucatan and Campeche.

Specimens examined.—Total number 45, from the following localities:

Yucatan: Puerto Morelos 2, La Vega 5, Tunkas 5, Chichen Itza 20.

Campeche: Apazote 17.

Remarks.—From *toltecus* this form is readily distinguished by darker coloration and brown instead of gray feet, from *saturatus* by duller colors and smaller size, and from both by its very light dentition. Specimens from Apazote and Chichen Itza are grading toward *saturatus*.

Sigmodon hispidus borucae Allen.

Sigmodon borucae Allen, Bull. Am. Mus. Nat. Hist. IX, 40, March 11, 1897.

Type locality.—Boruca, Costa Rica.

General characters.—Size medium, about as in *berlandieri*, pelage rather soft.

Color.—Upperparts dull yellowish brown; belly grayish or buffy white; feet grayish brown; tail blackish above, grayish brown below.

Skull.—Nearest to that of *saturatus* but distinguished by the smaller, flatter audital bullae, and other slight characters.

Measurements.—Type (from original description): total length 275; tail 115; hind foot (measured dry) 30. *Skull*: basal length 29; nasals 12; zygomatic breadth 18; length of upper tooth row 5.5.

Distribution.—Costa Rica; specimens examined from the type locality only.

Remarks.—*Sigmodon h. borucae* belongs to the *toltecus* group of rather small, dark colored forms, but shows good subspecific characters, differing from *toltecus* in darker coloration, brown instead of gray feet, heavier dentition and other slight skull characters; from *microdon* in larger size, longer tail, heavier dentition and flatter audital bullae; from typical *saturatus* in duller coloration, longer tail, flatter audital bullae; but from Guatemala specimens of *saturatus* it does not differ in color.

Sigmodon alleni sp. nov.

Type from San Sebastian, Mascota, Jalisco, Mexico, No. 88,227, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected March 15, 1897 by E. W. Nelson and E. A. Goldman. Original No. 10,708.

General characters.—Size of *berlandieri* but with slenderer feet and tail, smaller molars, brighter colors, and softer pelage; pelage fine and not hispid in winter or summer.

Color.—Upperparts dull tawny; belly white or buffy; feet yellowish brown; tail black above and brownish below. *Young*, dark umber brown, soon becoming tawny.

Skull.—Similar to that of *berlandieri* but with narrower braincase, double convex outlines of interparietal, smaller molars, and smaller, shorter, more rounded bullae.

Measurements.—Average of 8 adults from type locality: total length 244; tail 112; hind foot 31.6. *Skull* of type: basal length 29.3; nasals 13; zygomatic breadth 19.3; mastoid breadth 13; alveolar length of upper molar series 6.4.

Distribution.—Western Jalisco and southern Tepic in Western Mexico.

Specimens examined.—San Sebastian, Jalisco, 10, San Blas 1, Tepic 2, and Valle de Banderas 1.

Remarks.—Although belonging to the *hispidus* group, *alleni* is quite distinct from all neighboring species, occurring at the type locality with *mascotensis*, the west coast form of *berlandieri*, and at San Blas with *major*. It is the species Dr. Allen had in mind in writing his description of *mascotensis* from which he intended to separate the Colima form, but as his two specimens of the species here named *alleni* were not fully adult he unfortunately selected as his type another specimen that proves to be the same as the form to which on the following page he gave the name of *colimae*. As these two names apply to the same species I have placed *colimae* as a synonym under *mascotensis* and taken the opportunity of associating Dr. Allen's name with the species which he intended to describe.

***Sigmodon fulviventor* Allen.**

Sigmodon fulviventor Allen, Bull. Am. Mus. Nat. Hist., II, p. 180, October 21, 1889.

Type locality.—Zacatecas, Zacatecas, Mexico.

General characters.—Size largest of the hairy tailed group; tail covered with short, bristly hairs that almost conceal the annulations; pelage rather hispid.

Color.—Upperparts yellowish brown, lightened on sides by white bristles; upper half of outer surface of ear black; lowerparts and feet clear rich fulvous; tail brownish black above and below.

Skull.—Short, wide, and heavily ridged, not much arched, not bulged interorbitally; interparietal, about 2 mm. wide and not divided; supra-occipital with a slight median ridge; nasals short, wide and rounded at ends; jaw short and heavy with short, wide coronoid.

Measurements.—Type: total length 270; tail 108; hind foot 33. *Skull* of type: total length over incisors 35.5; nasals 13; zygomatic breadth 21.5; alveolar length of upper molar series 6.3. The broken base of the skull makes the usual set of measurements impossible.

Distribution.—Known only from two localities; from about 8000 feet altitude near the city of Zacatecas and from Durango, Durango. Specimens examined 2.

***Sigmodon melanotis* sp. nov.**

Type from Patzcuaro, Michoacan, Mexico, at 7000 feet altitude. No. 50,190, U. S. National Museum, Biological Survey Collection, ♀ ad. Collected July 15, 1892 by E. W. Nelson. Original No. 2834.

General characters.—Size nearly equalling that of *fulviventris*; colors darker and richer; pelage softer; tail equally hairy.

Color.—Upperparts dark, rich ochraceous, heavily lined with black; outer and part of inner surface of ears black; face and nose blackish; belly clear, dark, rusty ochraceous; feet yellowish brown; tail mainly black, yellowish below at base.

Skull.—High and heavily ridged in adults with zygomatic arches falling low at sides; interorbital space narrow and bulged on top; nasals rounded at ends: interparietal about 2 mm. wide and not divided; supraoccipital with distinct median ridge.

Measurements.—Type: total length 275; tail 100; hind foot 31. Average of 4 from type locality: 257; 102; 31. *Skull* of type: basal length 31.4; nasals 12.2; zygomatic breadth about 20.5; mastoid breadth 14.5; alveolar length of upper molar series 6.3.

Distribution.—Known only from a series of 15 specimens from Patzcuaro.

***Sigmodon minimus* Mearns.**

Sigmodon minima Mearns, Proc. U. S. Nat. Mus., XVII, 130, July 19, 1894.

Type locality.—Upper Corner Monument, Grant Co., New Mexico, on the Mexican boundary line 100 miles west of the Rio Grande.

General characters.—Size small, hind foot about 28; tail hairy as in *fulviventris*; pelage not hispid.

Color.—Upperparts clear gray, with coarsely grizzled appearance, and without yellowish on nose or rump; belly buffy; feet gray; tail brownish black above and below.

Skull.—Short and wide with abruptly spreading zygomata; interparietal narrow; supraoccipital with slight median ridge; audital bullae small and basioccipital narrowed between them.

Measurements.—Type: total length 223; tail 94; hind foot 28. Topotype: 223; 91; 27. *Skull* of type: basal length 28.5; nasals 11.3; zygomatic breadth about 19; mastoid breadth 14; alveolar length of upper molar series 5.9.

Distribution.—Mountains of southern New Mexico, Arizona and northern Mexico.

Specimens examined.—Total number 14 from the following localities:

New Mexico: Grant Co., near Mexican line, 2, (including type).

Arizona: Fort Huachuca 2.

Chihuahua: Casas Grandes 1.

Sonora: Santa Cruz River 9.

Remarks.—This is the northernmost form of the hairy tailed group.

***Sigmodon ochrognathus* sp. nov.**

Type from the Chisos Mts., Texas, 8,000 feet altitude No. 110,333, U. S. National Museum, Biological Survey Collection, ♀ ad. Collected June 13, 1901, by Vernon Bailey. Original No. 7681.

General characters.—Size small; tail long and hairy; pelage but slightly hispid.

Color.—Upperparts yellowish gray, strongly tinged around ears, face and rump with ochraceous; nose, orbital ring and base of tail clear, bright ochraceous; belly white; feet buffy gray; tail blackish above, buffy gray below.

Skull.—Similar to that of *minimus* but interparietal with a posterior indentation, bullae narrower and basioccipital shorter and wider; nasals short, wide, and truncate posteriorly.

Measurements.—Type: total length 260; tail 117; hind foot 29. *Skull* of type: basal length 28; nasals 11.6; zygomatic breadth 19; mastoid breadth 13; alveolar length of upper molar series 5.5.

Distribution.—The transition zone top of the Chisos Mts., Texas and 6,700 feet altitude near Parral, Chihuahua. Four specimens examined from the type locality, and one from near Parral.

***Sigmodon leucotis* sp. nov.**

Type from the Valparaiso Mts., Zacatecas, Mexico, 8,700 feet altitude, No 92,001, U. S. National Museum, Biological Survey Collection, ♀ ad. Collected December 2, 1897, by E. W. Nelson and E. A. Goldman. Original No. 11,812.

General characters.—Size medium; tail short and hairy; pelage rather soft; colors dull, with conspicuously light ears.

Color.—Upperparts dull brownish gray; ears whitish gray; belly whitish; feet brownish gray; tail black, becoming brownish at the base below.

Skull.—Short, wide and heavily ridged along sides; interparietal narrow, with a dividing suture across middle in 11 out of 13 specimens; supraoccipital sloping, without trace of median ridge; nasals short, narrow and notched at posterior end; audital bullae full and oval.

Measurements.—Average of 8 adult topotypes: total length 234; tail 91; hind foot 29.4. *Skull* of type: basal length 31; nasals 11.4; zygomatic breadth 20.5; mastoid width 15; alveolar length of upper molar series 6.

Distribution.—Known only from the type locality. Number of specimens examined 13.

Remarks.—The divided interparietal occurs in one other species from Oaxaca, but as it is not entirely constant it is probably of little significance.

***Sigmodon alticola* sp. nov.**

Type from Cerro San Felipe, Oaxaca, Mexico, at 10,000 feet altitude, No. 68,231, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected August 24, 1894, by E. W. Nelson and E. A. Goldman. Original No. 6624.

General characters.—Size medium; tail hairy; pelage long and soft both in winter and summer; colors dark and rich except gray ears.

Color.—Upperparts dark ochraceous or light umber brown; ears clear gray, a little darker than in *leucotis*; belly pale cinnamon brown; feet yellowish gray; tail black, becoming yellowish brown below at base.

Skull.—Similar to that of *leucotis* in form but slenderer, less heavily ridged and narrower interorbitally; interparietal narrow with a dividing suture in middle; supraoccipital without median ridge; nasals narrow and rounded at ends; lateral pits of palate very shallow.

Measurements.—Type: total length 230; tail 101; hind foot 28.5. *Skull* of type: basal length 28.5; nasals 11; zygomatic breadth 17.8; mastoid breadth 13.5; alveolar length of upper molar series 6.3.

Distribution.—Mountains of Oaxaca.

Specimens examined.—Cerro San Felipe 1, 15 miles west of Oaxaca 2.

***Sigmodon alticola amoles* subsp. nov.**

Type from Pinal de Amoles, Queretaro, Mexico, at 7,000 feet altitude. No. 81,430, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected September 18, 1898, by E. W. Nelson and E. A. Goldman. Original No. 10,161.

General characters.—Similar to *alticola* but upperparts duller and less tawny, skull wider interorbitally, with slightly smaller bullae and deeper lateral pits of palate; interparietal narrower but not divided.

Measurements.—Type: total length 252; tail 105; hind foot 29.5. *Skull* of type: basal length 29.5; nasals 5.7; zygomatic breadth 19.6; mastoid breadth 14; alveolar length of upper molar series 6.3.

Distribution.—Known from only 2 specimens from type locality.

Remarks.—While there seems hardly a possibility of continuity of range across the wide gaps of low country separating the type localities of the two forms, the slight difference of the present form from *alticola* does not admit of more than subspecific rank.